

# PATENT SPECIFICATION



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**156,038**

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## COMPLETE SPECIFICATION.

### Improvements in Flue-points or Ferrules for Connecting the Ends of Boiler Tubes to End-plates.

I, VICTOR FALLON FEENY, a British subject, of 60, Queen Victoria Street, London, E.C. 4, do hereby declare the nature of this invention (a communication 5 to me from Coleman Boiler Appliance Company, a corporation organized under the laws of the State of Delaware, and having offices at 406, Grosse Building, Los Angeles, California, U.S.A.) and in 10 what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a flue-point 15 or ferrule for connecting the ends of boiler flues, fire-tubes or smoke-tubes to boiler end plates.

Its object is to provide a flue-point or ferrule by means of which leakage of the 20 boiler flue connection, as commonly caused by expansion, contraction, vibration, and corrosion, will be largely obviated, thereby lengthening the life of the boiler, and decreasing the necessity 25 of repairs, the invention furthermore facilitating draught through the flue tube.

It is already known to provide a 30 water tube boiler with flue-points consisting of double cones of uniform internal diameter, the conical end portions fitting one within the internally tapered end of the flue-tube, and the other within an internally tapered annular flange pressed 35 up from the boiler plate, the parts being secured by longitudinal bolts extending between a cap riveted on the back of the flange and a lug-provided ring welded within the end of the tube.

According to the present invention, the 40 flue-point or ferrule comprises an integral cylindrical tube having a uniformly thickened intermediate portion terminat-

ing in shoulders to form abutments between the flue and the boiler plate, the 45 end portions of reduced outside diameter being adapted to be inserted lengthwise into a boiler flue and into a flue-opening in the boiler end-plate respectively, the latter opening being preferably tapered 50 outwardly. The parts are connected together by shrinking the tube upon the one extremity of the flue-point, and expanding the other extremity within the end-plate, the joints being also 55 welded brazed or secured by like operations.

The invention is illustrated in the accompanying drawings in which:—

Figure 1 is a perspective view of the 60 improved flue-point or ferrule.

Figure 2 is a view of the same in longitudinal section.

Figure 3 is a detail in section and elevation illustrating the manner of 65 application.

Figure 4 is a detail in section and elevation showing the completed connection of the flue-point or ferrule with the boiler flue-tube and the boiler end- 70 plate.

Figures 5, 6, 7, 8 and 9, are details in section illustrating modified forms of the connection between the flue-point and the boiler end-plate. 75

Figure 10 is a detail in section illustrating a modified form of the connection between the flue-point and the boiler flue-tube.

In these drawings, 11 indicates a 80 boiler end-plate, 12 a boiler flue-tube, and 13 the improved flue-point or ferrule designed to be interposed between the end-plate and the flue and connected thereto. The flue-point is formed with 85 an intermediate tubular portion 14 of

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equal diameter throughout and having an outside diameter substantially corresponding to that of the flue-tube so as not to take up more space than the flue 5 and a wall thickness greater than that of the flue to reinforce the connection and provide a thickened wall at the mouth of the flue where most subjected to the action of flames. One terminal 15 of the 10 flue-point or ferrule is reduced in outside diameter with a smooth exterior substantially to conform to the interior of the flue-tube and is adapted to be inserted lengthwise into the latter.

15 A shoulder 16 is formed between the portions 14 and 15 which is designed to be spaced from the end of the boiler-tube to form an annular channel to receive a spelter or brazing 17; the flue is shrunk 20 and welded on the terminal 15 and the spelter run in the channel so as to form a strong and tight joint. The joint thus formed presents a smooth exterior so as not to afford lodgment for matter which 25 would hasten corrosion. The shoulder 16 forms an abutment for preventing expansive strains from tending to sever the longitudinal portion of the joint between the tube and the flue-point or ferrule 30 and also provided a right angle joint which precludes ready leakage in event the joint should become loosened from any cause.

If desired, the reduced portion 15 may 35 be formed with a reverse taper, as shown in Figure 10, and the end of the boiler flue-tube reduced and welded thereover to further strengthen the joint against pulling strains; the spelter is run over 40 the contracted end of the flue as shown to embed same and form a smooth continuous surface at the joint.

The opposite terminal 18 of the flue-point is reduced in outside diameter and 45 is adapted to be inserted through an opening 19 in the boiler end-plate; the opening is of a diameter slightly greater than that of the reduced portion of the ferrule and preferably tapered outwardly, 50 its diameter being less than that of the boiler flue and hence smaller than usually employed, thus providing more metal between adjacent openings and adding strength to the end-plate. A shoulder 20 55 is formed between the portions 14 and 18 adapted to abut against the end-plate around the margin of the opening.

In effecting the connection between the flue-point and the boiler end-plate, the 60 reduced terminal 18 is inserted through the opening 19 from the inside of the end-plate and is swaged or expanded to conform to the tapered wall of the open-

ing. The outer end of the reduced terminal is then either beaded over to 65 engage the end-plate, as indicated at 21, or is secured thereto by a welded joint 22, as shown in Figure 8. If desired, a gasket 23 may be interposed between the reduced terminal 18 and the boiler end-plate, as shown in Figures 5, 6 and 7; in some instances the shoulder 20 may 70 be countersunk in the inner face of the boiler end-plate, as shown in Figure 6, and the bead 21 may be countersunk 75 in the outer face of the boiler plate, as shown in Figures 7 and 9.

The shoulder 20 prevents longitudinal expansion of the flue from loosening the end-plate and also co-operates with the bead and the flared reduced terminal in 80 engaging the end-plate on its opposite sides; the latter connections oppose pulling strains between the flue-point and the tube plate.

The flue-point has an internal diameter less than that of the flue-tube, throughout the major portion of its length, forming a restricted throat at the flue inlet which is flared outwardly at the inner 85 end of the flue-point to permit gradual expansion of gases entering the flue-tube proper, thereby inducing draught and also agitating same to assist combustion.

The flue-point or ferrule may be formed either of hard metal, such as steel, or iron, or it may be formed of the softer metals, such as copper, brass, bronze, or alloys. If a hard metal is employed, it is desirable to use the soft metal gaskets, as 90 shown in Figures 5, 6 and 7, but where the flue-point or ferrule is formed of a soft metal, such gaskets may be dispensed with and the flue-point connected directly to the end-plate, as shown in 95 Figures 3 and 4.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed (as communicated to me 110 by my foreign correspondents), I declare that what I claim is:—

1. A flue-point or ferrule comprising an integral cylindrical tube having a uniformly thickened intermediate portion 115 terminating in shoulders to form abutments between the flue and the boiler-plate, the end portions of reduced outside diameter being adapted to be inserted lengthwise into a boiler flue and into a 120 flue-opening in the boiler end-plate respectively and connected thereto substantially as described.

2. A flue-point or ferrule, according to Claim 1, comprising an integral cylindrical tube of equal inside diameter 125

throughout the major portion of its length and having its inner wall outwardly flared at the inner end.

3. A boiler flue-tube and end-plate connection, comprising an integral flue-point having an outside diameter substantially corresponding to that of the boiler flue and a wall thickness greater than that of the boiler flue with a uniform inside diameter throughout the major portion of its length, said flue-point reduced in outside diameter at its ends forming annular shoulders, both of said end-  
10 portions being smooth exteriorly, one of  
15 said end portions inserted in the end of

the boiler-flue with the shoulder spaced from the end of the latter, the flue being shrunk and welded on said flue-point and a spelter welded in the channel, formed between the flue-end and the shoulder, the reduced end of the flue-point passing through an opening in the boiler end plate and connected to the latter.

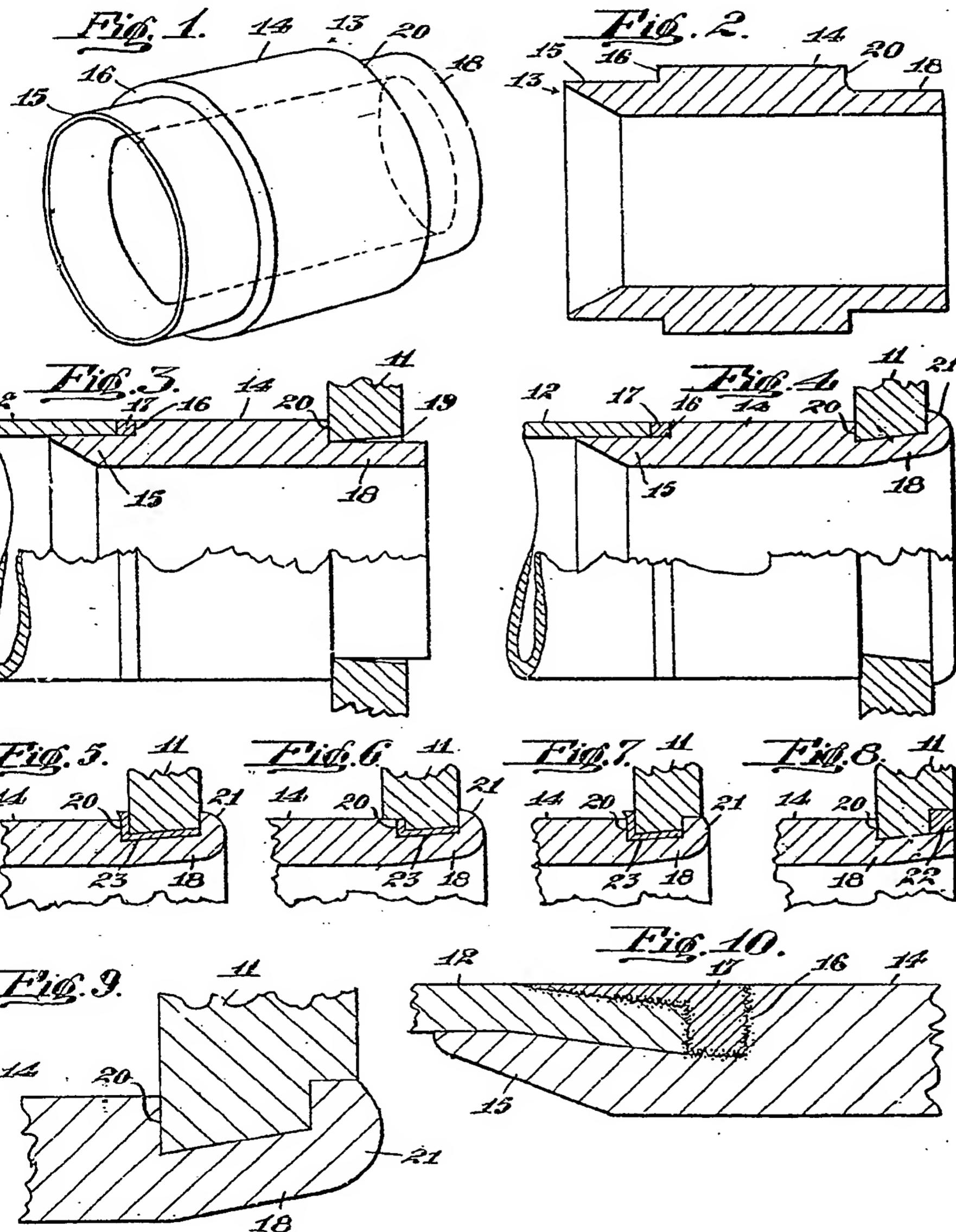
Dated this 29th day of April, 1920. 25  
For the Applicant,

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